

REMARKS/ARGUMENTS

Claims 1-36 and 39-43 are pending in this application. These claims are all rejected under 35 U.S.C. 102(b) over the disclosure contained in U.S. Patent No. 5,642,486 to Schmidt et al. This rejection is respectfully traversed.

In response to the rejection under §102 (b) noted above, applicants have amended claim 1, i.e., the only independent claim pending in this application, to recite that the aluminum oxide-containing or aluminum oxide/hydroxide-containing enveloping layer has a thickness of from 70-300 nm. Support for this amendment is found at p. 8, line 34 of the English translation of applicants' specification.

Turning to the Schmidt et al. reference, applicants note that the subject reference teaches a layer thickness for layer (A), which corresponds to applicants' claimed enveloping layer, of from 1 - 800 nm and preferably from 50-600 nm. Layer (A) can be composed of aluminum oxide, aluminum oxide hydrate and preferably silicon oxide and also of mixtures thereof (see, e.g., col. 4, lines 6-10). The reference additionally discloses, moreover, that as the layer thickness of layer (A) increases, the pigments repeatedly pass, in succession, through the interference colors (col. 4, lines 16-17). The reference teaches, further at col. 2, lines 37-39, that it is an object of the invention recited and claimed therein to provide particularly strong metallic effect pigments, i.e., pigments with a strong color flop. That is, it is well known by those working in this field that the thicker a layer is, the stronger the color flop is.

In contrast to Schmidt et al., the claims of the present application are directed to a pigment with significantly different properties from that taught by Schmidt et al. i.e., one having a soft color flop. As such, the claims have been limited (by virtue of the amendment to claim 1) to a pigment wherein the enveloping layer is limited to a thickness between 70-300 nm. Applicants recognize, of course, that the thickness range now recited in the present claims, i.e., 70-300 nm, overlaps with the much broader range (1-800 nm) taught for use in the cited reference. However, applicants contend that the very broad thickness range set forth in Schmidt et al. is not sufficient to anticipate the much narrower range as now recited in the present claims of this application. While such overlapping ranges between the prior art and later patent claims may present a number of complex considerations under the law of obviousness, it is not an anticipatory disclosure. See,

e.g., *Atofina v. Great Lakes Chemical Corp.*, 441 F. 3d 991, 999 (Fed. Cir. 2006) wherein the court held that a prior art temperature range of 100 to 500°C does not anticipate patent claims reciting a temperature range of 330 to 450°C. Thus, Schmidt et al. does not anticipate applicant's claims, as now amended, as a matter of law.

Further to the above, applicants note the Examiner's comments set forth on p. 3 of the Office Action that it is a known fact that aluminum has anti-corrosive property and while in the atmosphere or in a solution containing an oxidizing agent, the outer layer oxidizes to form a protective layer. The Examiner states, therefore, that it would have been obvious that under the set conditions, aluminum would form an oxidized protective layer.

In response to the Examiner's position as indicated above, applicants respectfully submit that aluminum oxide layers formed under normal atmospheric conditions typically have a thickness of between 3 and 5 nm, i.e., significantly less than the 70-300 nm layer thickness now specifically recited in applicants' amended claims. In support of applicants' contention that natural aluminum oxide layers formed under normal environmental conditions range in thickness between about 3 and 5 nm, attached to this response is an experimental report, prepared on behalf of the Assignee of the present application for use in a European Opposition proceeding against a competitor's European patent, which demonstrates that when such layers are formed, i.e., in a standard aluminum pigment prepared by the Assignee of the present application by ball milling, they range in thickness from 2.7 to 3.6 nm. While the original report is written in the German language, applicants have prepared an English language translation, but only of the text of the report. That is, the XPS spectra discussed in the report are only contained in the German version, but nevertheless they are believed to be decipherable by the Examiner.

Based on the data provided in the attached report, therefore, applicants respectfully submit that their claims reciting a layer thickness of 70-300 nm would not, in any case, be obvious over naturally occurring layers which range in thickness, as noted above, from about 3-5 nm (2.7 - 3.6 nm) as there is no case known to applicants wherein such naturally occurring layers even approached anywhere near the claimed range of thickness of 70 - 300 nm., being limited as they are to thickness of less than about 5 nm.

Pursuant to the remarks provided herein, therefore, applicants respectfully contend that their claims are neither anticipated by, or obvious over, the Schmidt et al. reference, whether or

not one takes into account the natural formation of layers having a thickness of about 3-5 nm. As such, the Examiner is respectfully requested to reconsider and withdraw the rejection and to pass the entire application through to an allowance.

If the Examiner does not agree but believes that an interview would advance the progress of this application, he is respectfully invited to telephone applicants' representative at the number below.

Information Disclosure Statement

Submitted herewith is a copy of art together with a form listing the same for the convenience of the Examiner.

No fee is believed to be due with this submission, since it is being made prior to issuance of a first Office Action concerning this matter. If any fee is due, however, authorization is hereby provided to charge the required amount to Deposit Account No. 15-0700.

Respectfully submitted,

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Prüfbericht P1171-K0028 rev 2
vom 02. 10. 2007

Oxidschichtdicken auf Al-Pigmenten

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Fragestellung

Die Oxidschichtdicken von Aluminiumpigmenten sollten mittels XPS bestimmt werden.

Probenmaterial und Präparation

Der Kunde lieferte folgende sechs Muster:

a) Frische Produktionschargen:

R 167 Ch 07G0048
MEX 2153 Ch 07G0047
MEX 2156 Ch 07G0102

b) ca. ein halbes Jahr alt sind folgende Chargen:

R 167 Ch 07G0009
MEX 2153 Ch 07G0011
MEX 2156 Ch 07G0020

Es handelt sich in allen Fällen um Testbenzinpasten. Der Lösemittelgehalt beträgt ca. 30 bis ca. 35 Gew.-%. Die Proben wurden durch Auswaschen mit Aceton und anschließendem Aufbringen der Aceton-Dispersion auf einen Probenhalter und Verdampfen des Lösemittels präparieren. So sollte eine möglichst planparallele Orientierung der Flakes zum Untergrund gegeben sein.

Darstellung der wichtigsten Ergebnisse / Interpretation

Die Oxidschichtdicke der Aluminiumoberflächen wurde anhand des Signalverhältnisses Metall zu Oxid in dem Al2p-Signal des Photoelektronenspektrums bestimmt. Das Verfahren ist beschrieben in B.R.Strohmeyer, Surface and Interface Analysis, Vol. 15, 51-56 (1990). Für die Auswertung kam Gleichung (4) der Veröffentlichung zum Einsatz.

Im Einzelnen ergibt sich folgendes:

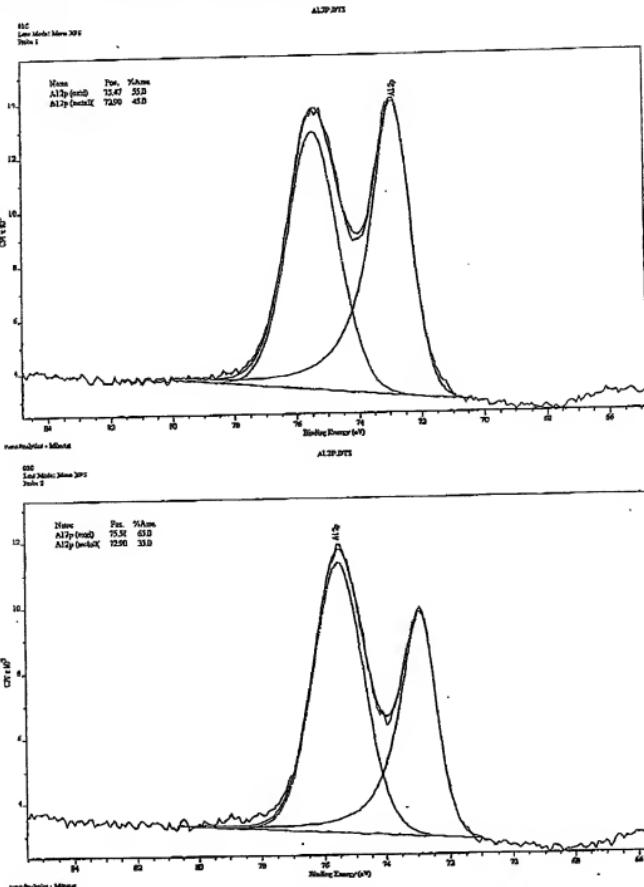
Dataset	Al 2p (metall) %	Al 2p (oxid) %	Al-Oxid- Dicke in nm
R167 07G0048	45.0	55.0	2.8
MEX 2153 07G0047	43.1	56.9	2.8
MEX 2156 07G0102	43.6	56.4	2.9
R167 07G0009	35.0	65.0	3.6
MEX 2153 07G0011	41.7	58.3	3.0
MEX 2156 07G0020	45.7	54.3	2.7

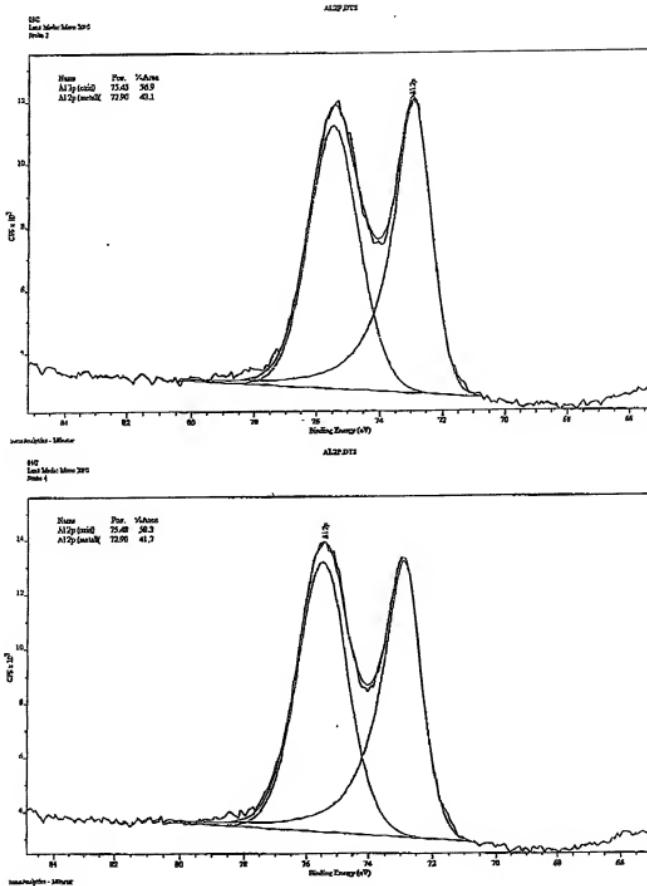
Der Messfehler lässt sich mit ca. 10%, bezogen auf die angegebenen Schichtdicken, abschätzen¹.

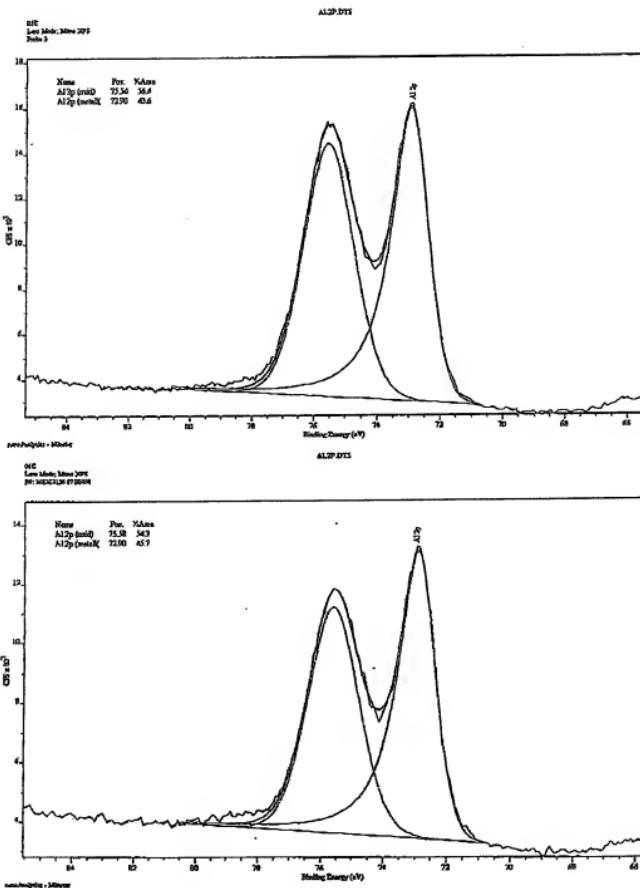
Die Oxidschichtdicke der frischen Produktionschargen liegt somit im Bereich von knapp 3 nm, nach einer Lagerdauer von $\frac{1}{2}$ -Jahr steigt die Oxidschichtdicke auf Werte zwischen knapp 3 und knapp 4 nm leicht an.

¹In der o.g. Veröffentlichung wurden Schwankungsbreiten für die in der Berechnung verwendeten Materialkonstanten angegeben. Auf Basis dieser Daten wurde der Messfehler für die angegebenen Schichtdicken abgeschätzt.

Anhang: Typische Messergebnisse







Eingesetzte Analyseverfahren und Geräte

Photoelektronenspektroskopie

Mit Hilfe der Photoelektronenspektroskopie (ESCA/XPS) kann die atomare Zusammensetzung der Oberfläche einer Probe quantitativ bestimmt werden. Zudem können durch Hochauflö-sungsspektren Informationen zum chemischen Bindungszustand der einzelnen Elemente ge-wonnen werden. Die Informationsstiefe liegt bei dieser Methode bei etwa 5 – 10 nm, die Nach-weisgrenze bei etwa 0,01 bis 1 At%.

Die Messung wurde mit einem Gerät der Firma Thermo VG Scientific, Typ ESCALAB 250, durchgeführt. Für die Anregung wurde nicht monochromatische Al K_α, Röntgenstrahlung ver-wendet (200 W, ca 1nm² Akzeptanzfleck). Die Transmissionsfunktion des Gerätes wurde an einer Kupferprobe bestimmt. Für die Messung der Spektren wurden folgende Einstellungen verwendet: Übersichtsspektren wurden mit einer Pass-Energie von 80 eV, Hochauflösungs-spektren mit 30 eV, gemessen.

Quantitative Angaben über die Oberflächenzusammensetzung wurden mittels Scofield-Faktoren an Übersichtsmessungen berechnet. Der Fehler (statistisch + systematisch) kann hier-bei mit etwa 10 % abgeschätzt werden. Der statistische Fehler einzelner Messungen wurde, wenn angegeben, mit Hilfe der Methode von Harrison und Hazel (SIA 18 368-376 (1992)) bestimmt. Quantitative Angaben über die Oberflächenzusammensetzung werden, wenn nicht anders angegeben, immer unter der Annahme gemacht, dass das analysierte Volumen homogen ist. Diese Methode ist nicht Bestandteil der Akkreditierung.

Schlussbemerkung – Ende des Prüfberichtes

Die in diesem Bericht zusammengefassten Analysen wurden nach dem derzeitigen Stand der Technik von entsprechend geschultem Fachpersonal durchgeführt. Analytikergebnisse beziehen sich ausschließlich auf das zur Verfügung gestellte Probenmaterial und den jeweils untersuchten Probenbereich zum Zeitpunkt der Analyse. Weitergehende Schlussfolgerungen auf Basis dieser Befunde liegen im alleinigen Verantwortungsbereich des Auftraggebers. Der Prüfbericht darf ohne die schriftliche Genehmigung des Prüflabors nur vollständig, nicht aber auszugsweise ver-vielfältigt werden.

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5 **Test Report P1171-K0028 Rev 2**
 of 2nd October 2007

Oxide Layer Thicknesses on Al Pigments

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We are a testing laboratory that is accredited to ISO
17025 for the procedures specified in the certificate
30 of accreditation

Our QM system complies with ISO 9001

Report submitted 24th April 2007

35 **nanoAnalytics**

Objective

The oxide layer thicknesses of aluminum pigments were to be determined by means of XPS.

5 Sample Material and Preparation

The customer supplied the following six specimens:

a) Fresh production batches:

R 167 Ch 07G0048

10 MEX 2153 Ch 07G0047

MEX 2156 Ch 07G0102

b) The following batches are approx. half a year old:

R 167 Ch 07G0009

15 MEX 2153 Ch 07G0011

MEX 2156 Ch 07G0020

Each of the batches are supplied as test petroleum pastes. The solvent content ranges from approx. 30% to approx. 35% by weight. The samples were prepared by 20 eluting with acetone and then placing the acetone dispersion onto a sample holder and evaporating the solvent. This method was used to make the orientation of the flakes as coplanar as possible with the substrate.

25 . Presentation of the Most Important Results / Interpretation

30 The oxide layer thickness on the aluminum surfaces was determined by measuring the metal to oxide signal ratio in the Al2p signal of the photoelectron spectrum. The procedure is described in B.R.Strohmeier, Surface and Interface Analysis, Vol. 15, 51-56 (1990). Equation (4) of that publication was used in the analysis.

35 The detailed results were as follows:

Al 2p

Al 2p

Al Oxide

Data Set	(metal) %	(oxide) %	Thickness in nm
R167 07G0048	45.0	55.0	2.8
MEX 2153 07G0047	43.1	56.9	2.9
MEX 2156 07G0102	43.6	56.4	2.9

5

R167 07G0009	35.0	65.0	3.6
MEX 2153 07G0011	41.7	58.3	3.0
MEX 2156 07G0020	45.7	54.3	2.7

The measurement error was estimated to be approx. 10%
10 of the stated layer thickness¹.

The oxide layer thickness of the fresh production
batches therefore lies in a range just below 3 nm;
15 following storage for a period of ½ year, the oxide
layer thickness increases slightly to values between
just under 3 and just under 4 nm.

1 Margins of deviation for the material constants used
in the calculation were given in the abovementioned
20 publication. The measurement error for the layer
thicknesses stated was estimated on the basis of these
data.

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Annex: Typical Measurement Results

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Analytical Procedures and Apparatus Employed

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Photoelectron Spectroscopy

With the use of photoelectron spectroscopy (ESCA/XPS),
it is possible to quantitatively determine the atomic
10 composition of the surface of a sample. Furthermore,
information regarding the chemical bonding state of the
individual elements can be obtained from high
resolution spectra. The information depth for this
method is about 5 - 10 nm; the detection limit is about
15 0.01 to 1 atom%.

The measurement was performed using an instrument from
the Thermo VG Scientific company, model ESCALAB 250.
Non-monochromatic Al K_α X-rays were used for excitation
20 (200 W, approx. 1 mm² analysis area). The transmission
function of the instrument was determined using a
copper sample. The following settings were used for
measuring the spectra: overview spectra were measured
25 with a pass-energy of 80 eV; for high resolution
spectra, 30 eV was used.

Quantitative values for the surface composition were
calculated for overview measurements by applying
Scofield factors. The error (statistical + systematic)
30 in connection with this can be estimated at about 10%.
The statistical error in individual measurements was,
when given, determined using the method of Harrison and
Hazell (SIA 18 368-376 (1992)). Quantitative values for
35 the surface composition are, unless otherwise stated,
always given under the assumption that the analyzed
volume is homogenous. This method does not constitute
part of the accreditation.

Concluding Remark - End of the Test Report

The analyses summarized in this report were performed according to the current state of the art by suitably trained and qualified personnel. The results of the analyses apply solely to the sample material provided and, in each case, to the sample area tested at the time of the analysis. Additional conclusions drawn on the basis of these findings are the sole responsibility of the contracting party. This test report may be reproduced without the written permission of the test laboratory only in its entirety; the reproduction of extracts thereof is not permitted.

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